

Hexadecimal Codes and Conversion

Convert hexadecimal to binary and decimal

It is sometimes necessary to convert hexadecimal numbers (HEX) output in a message into decimal. In Release 15, the LD 32 CONV command can be used to convert TNs between hex and decimal.

Example: a single density terminal number is output as 081A hexadecimal. To find the decimal equivalent:

1. Convert each HEX digit into binary. See Table 1.

hex: 081A binary: 0000 1000 0001 1010

2. Decode the binary number using the formats shown in Figure 1. In this example, the TN is single density.

Group: 000 = 0 decimal

Loop: 01000 = 8 decimal

Shelf: 00 = 0 decimal

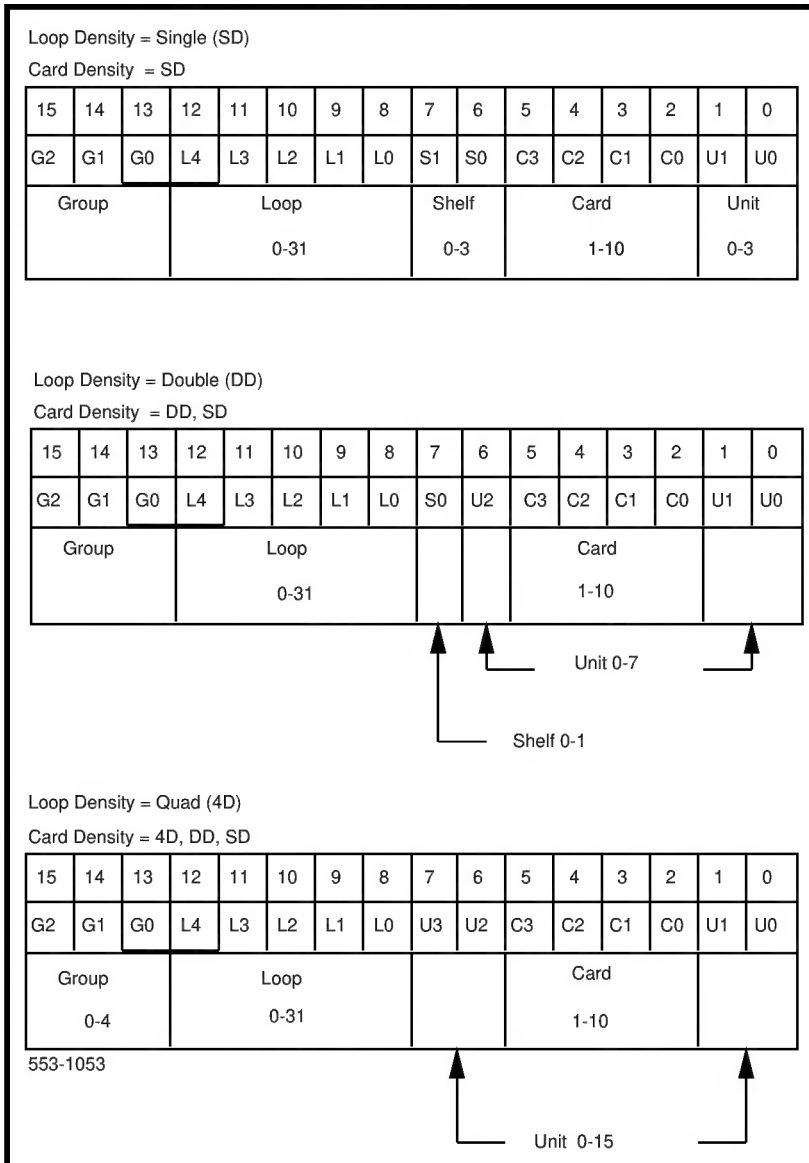
Card: 0110 = 6 decimal

Unit: 10 = 2 decimal TN in decimal = 8 0 6 2.

Table 1: Convert hex to binary and decimal

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Binary	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Figure 1
Terminal number formats



NT8D01 Controller faceplate codes

The NT8D01 Controller faceplate has a two digit hexadecimal display. The display has two modes of operation: normal operation and power on reset self-test.

Normal operation

During normal operation the display alternately shows

1. The Controller number (1-95) in hexadecimal.
2. The port on which the Controller clock is tracking. The tracking is indicated by the decimal points before and after the digit. The possible tracking modes are:

C0 - Controller tracking to the network connected to port 0.

C1 - Controller tracking to the network connected to port 1.

C2 - Controller tracking to the network connected to port 2.

C3 - Controller tracking to the network connected to port 3.

CF - Controller not tracking any network.

See also **LD 30** for the following commands:

CPED : clear Peripheral Controller maintenance displays

RPED : read Peripheral Controller maintenance displays

Self-tests

During the self-tests, the display quickly shows the self-tests listed below. If a test fails, the display shows the number of the failed test for 0.5 seconds before continuing the remaining tests. The self-test sequence is repeated until all tests pass.

Table 2: Controller self-test codes

Code	Definition
02	A31 #1 external buffer test.
03	A31 #1 internal context memory test, phase A.
04	A31 #1 internal context memory test, phase B.
05	A31 #1 internal TXVM memory test.
06	A31 #1 configuration memory test.
07	A31 #1 external FIFO test.
08	A31 #2 external buffer test.
09	A31 #2 internal context memory test, phase A.
0A	A31 #2 internal context memory test, phase B.
0B	A31 #2 internal TXVM memory test.
0C	A31 #2 configuration memory test.
0D	A31 #2 external FIFO test.
0E	peripheral side W72 loopback test using A31 #1.
0F	peripheral side W72 loopback test using A31 #2.
10	R72 #1 N-P switching control memory test.
11	R72 #1 320 x 8 NIVD buffer test.
12	R72 #1 N-P quiet-code register test.
13	R72 #1 P-N switching control memory test.
14	R72 #1 640 x 8 XIVD buffer test.
15	R72 #1 640 x 8 XIVD loopback buffer test.
16	R72 #1 P-N quiet-code register test.
17	R71 #1 register test.
18	R71 #1 continuity test, peripheral side.
19	R71 #1 continuity test, network side.
1A	R71 #1 simulation packet transmission test.
1B	DUART port A self-test.
1C	DUART port B self-test.
1D	R72 #2 N-P switching control memory test.
1E	R72 #2 320 x 8 NIVD buffer test.
1F	R72 #2 N-P quiet-code register test.
20	R72 #2 P-N switching control memory test.
21	R72 #2 640 x 8 XIVD buffer test.
22	R72 #2 640 x 8 XIVD loopback buffer test.
23	R72 #2 P-N quiet-code register test.
24	R71 #2 register test.
25	R71 #2 continuity test, peripheral side.
26	R71 #2 continuity test, network side.
27	R71 #2 simulation packet transmission test.
EE	Bus error, exception errors, etc.

Mass Storage Interface (MSI) faceplate codes

The Mass Storage Interface (MSI) card is located on the CPU shelf of systems equipped with disk drives. Table 3 applies to QPC584E and earlier versions. If the faceplate cable is disconnected, the MSI displays AF for about 7 seconds then flashes 55 followed by 10, the idle state. IOD050 and OVL005 messages are output.

Table 3: Mass Storage Interface (MSI) faceplate codes

The meaning of the code depends on whether the display is alternating, counting, flashing or steady.

Mass Storage Interface Faceplate Codes		
Display Status	Code	Meaning
Alternating	Ax	The MSI is reading disk records.
Counting	00-50	During the restore command in LD 43, the MSI display counts from 0 to 32 hex as the floppies are being copied to hard disk. Each count corresponds to a block of data being transferred. It also counts down when a second copy of the floppy is made on the hard disk.
	55-00	During the running of LD 37 I/O Diagnostic commands: During execution of the MSI 0 command, the display shows a pattern counting down from 55 to 00 on two separate occasions. Each count occurs in approximately 1 second intervals. This simulates the fast forward and reverse tape motion which takes about 85 seconds each. During execution of the MSI RW 0 command, after the A1-AF pattern indicating records are being read, there is an occasional '8B' indicating records are being written. When writing to a floppy with the write protect tab on, the display flashes 97 and IOD075 is output.
Flashing	00	Hard disk or floppy disk is not formatted (QPC584A to D). For QPC584E or later, 00 indicates missing information from disk.
	01	No Index/Sector signal (hardware/disk error).

Mass Storage Interface Faceplate Codes		
Display Status	Code	Meaning
Flashing	02	No seek complete on the floppy disk (hardware/disk error).
	03	Write fault.
	04	Addressed disk drive is not ready. Check that the floppy disks are in place and that they are properly seated. Be sure that the floppy disks are not upside down or backwards in their drives.
	05	Addressed disk drive is not selected. Check that the drive is present, and the cables to the controller are correct. If the MSU has just been powered on, the MSI must be initialized. This is done by turning the MSI switch from ENL to DIS and back to ENL.
	06	No Track Zero found (hardware error).
	07	Multiple Drives selected (hardware error).
	0D	A command is still executing and a new command is issued.
	10	Check Sum Error (hardware/medium error).
	11	Read Error (medium error).
	12	No address mark found in ID field on disk (medium error).
	13	No address mark found in data field on disk (medium error).
	14	No record found (disks) (medium error).
	15	Seek error (hardware error).
	1A	Too many parameters (illegal request).
	20	Invalid Command (illegal request).
	21	Illegal parameters were sent to the controller. For QPC584E; 21 indicates invalid address on disk.
	22	Switching from hard disk to floppy disk for normal operation.
	23	Disk capacity overflow (illegal request).
	24	Illegal field in command (illegal request).
	25	Invalid drive selection (illegal request).
	26	Invalid field in parameter list (illegal request).
	27	Write protected (also see 97).
	28	Disk changed.

Mass Storage Interface Faceplate Codes		
Display Status	Code	Meaning
Flashing	29	Power on reset occurred.
	2A	Drive parameters changed.
	2B	Floppy disk controller error.
	31	Drive format is corrupted (medium error).
	33	Switching from floppy disk to hard disk for normal operation.
	40	RAM failure (hardware error).
	41	ECC diagnostic failure (hardware error).
	91	Uncorrectable error in data field of diskette. Replace the floppy disk that was being accessed when the error occurred.
	92	Controller did not detect the address mark in the Identification (ID) field.
	94	Controller could not find the requested record.
	95	Seek error. The Controller could not find the specified track.
	97	Attempting to write on a write-protected disk. Floppy disk B has a write-protect tab.
	BA	Write error.
	BC	A diskette write error occurred during the write of a record.
	BD	Logical Record Count (LRC) mismatch during disk write. The LRC calculated by the MSI does not agree with the LRC sent by the system.
	BE	Record Number (RN) mismatch during disk write. The current RN in the MSI does not agree with the RN sent by the system.
	BF	Illegal Record Type (RT) during disk write. The record requested by SL-1 to be written onto diskette is neither a configuration record (RT8) nor data record (RT7).
	CA	Beginning to copy data from floppy disk A to hard disk.
	CA	Beginning to copy data from floppy disk B to hard disk.
	CC	Copy (restore) from floppy disk to hard disk is complete.
	CD	Hard disk has been positioned to shipping zone.

Mass Storage Interface Faceplate Codes		
Display Status	Code	Meaning
Flashing	D0	Attempting to do a data base back up when there are no data records on the hard disk. Do a data dump to the hard disk before doing the backup to the floppy disks.
	D1	Attempting to do a data base back up when MSI switch settings have not been set for operation from a hard disk.
	D6	Read error of hard disk private sector.
	DD	Data dump (back-up) to floppy disk B is beginning.
	DC	Data dump (back-up) to floppy disk is complete.
	E1	Cartridge time-out because MSI data cartridge is not present. Install a data cartridge.
	E2	Illegal MSI data cartridge. Check that the data cartridge is properly installed (proper orientation with all pins inserted), or replace data cartridge.
	E3	Disk ID on floppy does not match ID in data cartridge. Replace floppy or cartridge.
	E4	Mismatch in System Version Number (SVN). SVN on disk does not match SVN in MSI data cartridge. Replace floppy disks or cartridge. SVN indicates the SL-1 machine type. For example the SVN for SL-1 XN it is 911.
	E5	Mismatch in System Issue Number (SIN). SIN release number on disk does not match SIN release number in MSI data cartridge. Replace floppy disks or data cartridge. SIN consists of two parts: a release number and an issue number. The release number is the most significant (decimal) digit of the SIN and the issue number is the lease two significant digits. For example, a SIN of 855 means a release number of 8 and an issue number of 55. The MSI only compares the release portion of the SIN.
	E6	Diskette read error encountered during attempted read of the private sector. Check that the floppy disk is present.
	E7	Diskette write error encountered during attempted write to the private sector. Check that the write-protect tab has been removed from the floppy disk in drive B.
	E8	Illegal attempt to write onto floppy disk A. This is not allowed.

Mass Storage Interface Faceplate Codes		
Display Status	Code	Meaning
Flashing	E9	Illegal attempt to write to track 1 or track 2 space on the hard disk. This is not allowed.
	EA	Illegal value was written into track register. The value written was not 1, 2, 4 or 8.
	EC	Conversion error in computing logical sector number for hard disk.
	EE	Maximum record number was exceeded during a database write to disk.
	FA	Fault in floppy drive A. Self-test failed. Check cabling to drive A, check drive DIP switches or replace drive.
	FB	Fault in floppy drive B. Self-test failed. If code 97 was displayed before FB, the write-protect tab is in place and the write test could not be completed. Remove the write-protect tab on floppy disk B. Otherwise, check cabling to drive B, check drive DIP switches or replace drive.
	FC	Fault in hard disk drive C. Self-test failed. Check cabling to drive C, check drive DIP switches or replace drive.
	FD	Wrong floppy disks in drives.
	FE	Read error.
	FF	Floppy disk is in the wrong drive. Floppy disk A is in drive B and floppy disk B is in drive A. Drive A must contain a Track 1 floppy, Drive B a Track 3 floppy.
Steady	00	Mass Storage Interface (MSI) power-up completed.
	10	Mass Storage Interface (MSI) in idle state.
	2F	Unknown command from CPU.
	81-8F	Codes 81 to 8F indicate the MSI is simulating tape functions.
		81 = Slow forward with Inter-record Gap (IRG)
		82 = Slow reverse with Inter-record Gap (IRG)
		83 = Fast forward with Inter-record Gap (IRG)
		84 = Fast reverse with Inter-record Gap (IRG)
		85 = Rewind

Mass Storage Interface Faceplate Codes		
Display Status	Code	Meaning
Steady		89 = Set timer (to a maximum of 64 ms)
		8A = Read disk
		8B = Write disk
		8C = Diagnostic write
		8D = Diagnostic fast forward
		8E = Diagnostic fast reverse
		8F = Unrecognized command
	A1	MSI has completed reading a record from disk and is transferring the data to the CPU.
	A2	MSI has completed writing a record from its write buffer onto a diskette.
	AD	during restore and backup for hard disk, the Mass Storage Interface (MSI) is waiting for the disk controller to indicate that it has completed execution of the command.
	AE	MSI has sent a status request to the Disk Controller.
	AF	MSI has issued a command to the Disk Controller.
	C2	Copying track 1 to track 2 on hard disk.
	C4	Copying track 3 to track 4 on hard disk.
	FE	Read error.
	FF	Floppy disk is in the wrong drive. Floppy disk A is in drive B and floppy disk B is in drive A. Drive A must contain a Track 1 floppy, Drive B a Track 3 floppy.

Floppy Drive Interface pack (FDI) faceplate codes

The codes listed in this table appear on the Floppy Disk Interface (FDI) circuit pack located on the CPU shelf of systems equipped with disk drives.

Table 4: Floppy Drive Interface pack (FDI) faceplate codes

The meaning of the code depends on whether the display is alternating, counting, flashing or steady.

Floppy Drive Interface Faceplate Codes		
Display Status	Code	Meaning
Alternating	A1-70	FDI is reading disk records.
Counting	55-00	Display counts down in hexadecimal from 55 to 00 in approximately 1 second intervals. This display will run through two cycles. This is to simulate fast-forward and fast-reverse tape motion during diagnostics.
Flashing	44	Sanity timer has timed-out. Extraordinary situation.
	55	Floppy Disk Unit (FDU) or CPU not responding. The FDU may have no power. Check FDI to FDU cable. This message is also displayed if the CPU does not respond to the FDI after giving it a command.
	60	Missing address mark. The Floppy Disk Controller (FDC) cannot detect the ID address mark after encountering the index hole twice. Check the cable or replace the diskette (disk error).
	61	Not able to write. The Floppy Disk Controller (FDC) has detected a write protect signal from the addressed drive. Remove the write protect tab on floppy disk B and try again.
	62	No data. Floppy Disk Controller (FDC) cannot find the sector specified (disk error).
	63	Overrun. Floppy Disk Controller (FDC) is not being serviced fast enough by the CPU (FDC/hardware error).
	64	Data error. A checksum error in the ID field or the data field was detected (disk error).
	65	End of cylinder. An attempt has been made to access beyond the final sector of a cylinder (FDC/hardware error).

Floppy Drive Interface Faceplate Codes

Display Status	Code	Meaning
Flashing	66	Missing address mark in data field. In conjunction with (60), this specifies the missing address mark to have occurred in a data field (disk error).
	67	Bad cylinder. The cylinder address as read from the disk does not match the cylinder address loaded into the Floppy Disk Controller (FDC), and the disk cylinder address equals FFH (FDC/hardware error).
	68	Wrong cylinder. The cylinder address as read from the disk does not match the cylinder address loaded into the Floppy Disk (FDC) (FDC/hardware error).
	69	Data error in data field. A checksum error was detected in the data field (disk error).
	6A	Control mark. A sector with a deleted data address mark was encountered (disk error).
	72	Abnormal termination. Command execution started but not be successfully completed.
	74	Interrupt module error. An error was detected during execution of interrupt module.
	75	Read2s module error.
	76	Write2s module error.
	77	Initctrl module error.
	78	Command interface error. Incorrect hand shaking between Floppy Disk Controller (FDC) and CPU during attempt to load command block.
	79	Result interface error. Incorrect handshaking between Floppy Disk Controller (FDC) and CPU during attempt to read result bytes.
	7A	RXRSLT module error.
	7C	Addressed drive not ready.
	7D	Invalid hard disk operation attempted.
	7E	Logical sector number out-of-range.
	BA	Write error.
	BC	A disk write error occurred during the write of a tape record.

Floppy Drive Interface Faceplate Codes

Display Status	Code	Meaning
Flashing	BD	Checksum mismatch during disk write. The checksum calculated by the MSI does not agree with the checksum sent by the system.
	BE	Record Number (RN) mismatch during disk write. The current RN in the MSI does not agree with the RN sent by the system.
	BF	System has requested that a record be written to a disk. The record is neither a configuration record nor a data record.
	E1	Cartridge timeout because MSI data cartridge is not present. Install a data cartridge.
	E2	Illegal MSI data cartridge. Check that the data cartridge is properly installed (proper orientation with all pins inserted), or replace data cartridge.
	E3	Disk ID on floppy disk does not match disk ID in data cartridge. Replace floppy disks or data cartridge.
	E4	Mismatch in System Version Number (SVN). SVN on disk does not match SVN in MSI data cartridge. Replace floppy disks or cartridge.
	E5	Mismatch in System Issue Number (SIN). SIN release number on disk does not match SIN release number in MSI data cartridge. Replace floppy disks or data cartridge.
	E6	Diskette read error encountered during attempted read of the private sector. Check that the floppy disk is present.
	E7	Diskette write error encountered during attempted write to the private sector. Check that the write-protect tab has been removed from the floppy disk in drive B.
	E8	Illegal attempt to write onto floppy disk A. This process is not allowed.
	EA	Illegal value was written into track register. The value written was not 1, 2, 4 or 8.
	EE	Maximum record number was exceeded during database write to disk.
	FA	Fault in floppy drive A. Self-test failed. Check cabling to drive A or replace drive.

Floppy Drive Interface Faceplate Codes

Display Status	Code	Meaning
Flashing	FB	Fault in floppy drive B. Self-test failed. If code 61 was displayed before FB, the write-protect tab is in place and the write test could not be completed. Remove the write-protect tab on floppy disk B. Otherwise, check cabling to drive B or replace drive.
	FD	Wrong floppy disks in drives.
	FE	Read error.
	FF	Floppy disk is in the wrong drive. Floppy disk A is in drive B and floppy disk B is in drive A. Insert disks in the proper drives.
Steady	00	Floppy Disk Interface (FDI) power-up completed.
	10	Floppy Disk Interface (FDI) in idle state.
	2F	Unknown command from CPU.
	70	Invalid command. Floppy Disk Controller (FDC) has received an unrecognizable command. This code also signals the successful completion of all asynchronous processing.
	71	Asynchronous command complete.
	73	Ready status change.
	7B	Synchronous command complete.
	81-8F	Codes 81 to 8F indicate the FDI is simulating tape functions. 81 = Slow forward with Inter-record Gap (IRG) 82 = Slow reverse with Inter-record Gap (IRG) 83 = Fast forward with Inter-record Gap (IRG) 84 = Fast reverse with Inter-record Gap (IRG) 85 = Rewind 89 = Set timer (to a maximum of 64 ms) 8A = Read disk 8B = Write disk 8C = Diagnostic write 8D = Diagnostic fast forward 8E = Diagnostic fast reverse 8F = Unrecognized command
	A1	Floppy Disk Interface (FDI) has completed reading a record from a disk into its read buffer and is transferring the data to the CPU.

Floppy Drive Interface Faceplate Codes

Display Status	Code	Meaning
Steady	A2	Floppy Disk Interface (FDI) has completed writing a record from its write buffer onto a disk.
	CC	Data transfer from cartridge is complete.

Maintenance Display Codes

The maintenance display indicates status and error conditions. The display is located on the Interface or Miscellaneous card in the CPU.

Note: Option 11 does not have a maintenance display, the HEX codes are displayed on the maintenance terminal during Initialization or Sysload.

In Option 81, the maintenance display on the NT6D66 Call Processor (CP) Card shows two lines of information, with up to 16 characters per each line. The hexadecimal code and its definition are shown on the display.

Each new code shown on a maintenance display overwrites the one before it. However:

- All codes received on common equipment displays are recorded. You can review them by printing the History File (if equipped).
- The most recent 16 codes displayed on a controller card stay in memory. You can review them and reset the counter through the Network and Signaling Diagnostic (LD 30).
- In Option 51C, 61C, 81, and 81C, the most recent 64 displays on a CP card stay in memory. You can review the displays on the active CP card through the Core Common Equipment Diagnostic (LD 135).

Table 5 on page 509 lists the cards with maintenance displays and the type of information indicated by the codes on each card.

Table 5: Circuit cards with maintenance displays

System options	Circuit card	Display indication (for all related cards)
21A, 21	NT8D19 Memory/ Peripheral Signaling Card	Sysload status
21E	NTND01 ICM Card	Interrupt faults
51, 61, 71	QPC580 CPU Interface Card	Memory faults
51C, 61C, 81, 81C	NT6D66 Call Processor Card	Common equipment hardware faults
21A, 21, 21E, 51, 61	QPC742 Floppy Disk Interface Card	Faults on the disk drive unit
51, 61, 71	QPC584 Mass Storage Interface Card	Faults on the disk drive interface card
51C, 61C, 81, 81C	NT6D63 I/O Processor Card	
21, 21E, 51, 51C, 61, 61C, 71, 81, 81C	NT8D01 Controller Card	During normal operation, display shows port number on which controller clock is tracking and self-test codes

System Element Abbreviations

Some error conditions indicate hardware faults. In these cases, try to isolate the fault by replacing the cards in the order listed. The following abbreviations are used:

CIM	Control Interface and Memory
CMA	Changeover and Memory Arbitrator
CPU	Central Processing Unit
CT	Control and Timing
FN	Function
IF	Interface
MEM	Memory
MFS	Multifrequency Sender
MISC	Miscellaneous
PS	Peripheral Signaling
ROM	Read Only Memory
SDI	Serial Data Interface
TDS	Tone and Digit Switch
TT	Tone Transmitter
TD	Tone Detector
PRI	Primary Rate Interface
MISP	Meridian ISDN Signalling Processor

Note: The following 3 digit Hex codes do not apply to Option 11.

Maintenance display codes

Code	Description
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- | | |
|----|---|
| 01 | Manual interrupt or Power Monitor interrupt.
For system Options NT, RT, XT, 51 and 61, replace: IF, FN.
For system Options XN and 71, replace: FN, CT, MISC.
For all other system Options, replace: CPU, MISC, PS. |
| 02 | Peripheral Signal ROM checksum error.
For system Options NT, RT, XT, 51 and 61, replace IF.
For system Options XN and 71, replace: CIM.
For system Option 11, replace: CPU.
For all other system Options, replace: ROM. |

Maintenance display codes

- 03 Real-time Control (RTC) interrupt fault.
For system Options NT, RT, XT, 51 and 61, replace: IF.
For system Option 11, replace: CPU.
For system Options XN and 71, replace: CT.
- 04 Input Output (I/O) interrupt fault.
For system Options NT, RT, XT, 51 and 61, replace: FN.
For system Options XN and 71, replace: MISC.
For system Option 11, replace: CPU, TT/TD/SDI, SDI, card option mail, PRI, MISP.
For all other system Options, replace: MISC, SDI, TDS, MFS.
- 05 For system Option 11, replace: CPU. For all other system Options, replace:PS.
- 06 For system Option 11, replace: CPU. For all other system Options, replace:MISC, PS, MFS.
- 07 Real-time Control (RTC) interrupt fault.
For system Options NT, RT, XT, 51 and 61, replace: IF.
For system Options XN and 71, replace: CIM.
For system Option 11, replace: CPU. For all other system Options, replace: ROM.
- 08 Too many initializes on this CPU.
- 09 CMA transmission error. Replace: primary CMA, secondary CMA, Memory.
- 0A CMA transmission error secondary, Memory Trouble Register (MTR) primary is disabled. Replace: primary CMA, secondary CMA.
- 0B CMA transmission error secondary, Memory Trouble Register (MTR) secondary is disabled. Replace: secondary MEM, secondary CMA, primary CMA.
- 0C PS ROM response timeout. Replace: CIM, IF.
- 0D Parity error at non-memory address. Replace: IF, CMA.
- 0E Parity error in PS ROM. Replace: IF, FN.
- 0F Trap with no known cause.
- 10 Replace Memory 00.
- 11 Replace Memory 01.
- 12 Replace Memory 02.
- 18 Replace Memory 10.
- 19 Replace Memory 11.
- 1A Replace Memory 12.

Maintenance display codes

- 20 Primary memory parity error on read or write.
For system Options NT, RT, XT, 51 and 61, replace: CMA, IF. For system Option 11, replace: CPU. For all other system Options, replace: CMA, MISC.
- 21 Memory parity error - primary and/or secondary.
For system Options XN and 71, replace: prime CMA, secondary CMA, MISC. For all other system Options, replace: prime CMA, secondary CMA, IF.
- 22 Cannot clear CMA interrupt.
For system Options XN and 71, replace: prime CMA, secondary CMA, MISC. For all other system Options, replace: primary CMA, secondary CMA.
- 23 CMA fault. Replace: CMA0, CMA1.
- 24 Data store failed to respond when reading trap data block. Replace: Memory, CMA, IF, FN.
- 25 Checksum failed. For system Option 11, replace: CPU. Replace: Memory, CMA, IF, FN.
- 4x Peripheral Signaling card failure, where x is the PS number.
- 5x Replace Intergroup Switch, where x is the IGS number in hex. (0-F = 0-15).
During SYSLOAD the following codes appear:
 5B = loading firmware
 5C = loading program
 5D = loading data
 5E = initializing data store (protected and unprotected)
 5F = loading process successful
- 60 Replace Intergroup Switch 16.
- 61 Replace Intergroup Switch 17.
- 62 Replace Intergroup Switch 18.
- 63 Replace Intergroup Switch 19.
- 6E Replace Clock Controller 0.
- 6F Replace Clock Controller 1.
- 7x Replace TAPE or MSI x.
- 8x Replace Serial Data Interface x, where x is the port number in hex. (0-F = 0-15). For Option 11, x is card number in Hex.

Maintenance display codes

- 9x Replace network, conference or TDS loop for group 0, where x is the loop number in hex (0-F = 0-15).

Group 0	Loop Number
90	loop 0
91	loop 1
92	loop 2
93	loop 3
94	loop 4
95	loop 5
96	loop 6
97	loop 7
98	loop 8
99	loop 9
9A	loop 10
9B	loop 11
9C	loop 12
9D	loop 13
9E	loop 14
9F	loop 15

- Ax Replace network, conference or TDS loop for group 0, where x is the loop number in hex (0-F = 16-31).

Group 0	Loop Number
A0	loop 16
A1	loop 17
A2	loop 18
A3	loop 19
A4	loop 20
A5	loop 21
A6	loop 22
A7	loop 23
A8	loop 24
A9	loop 25
AA	loop 26
AB	loop 27
AC	loop 28
AD	loop 29
AE	loop 30
AF	loop 31

Maintenance display codes

Bx Replace network, conference or TDS loop for group 1, where x is the loop number in hex (0-F = 32-47).

Group 1	Loop Number
B0	loop 32
B1	loop 33
B2	loop 34
B3	loop 35
B4	loop 36
B5	loop 37
B6	loop 38
B7	loop 39
B8	loop 40
B9	loop 41
BA	loop 42
BB	loop 43
BC	loop 44
BD	loop 45
BE	loop 46
BF	loop 47

Cx Replace network, conference or TDS loop for group 1, where x is the loop number in hex (0-F = 48-63).

Group 1	Loop Number
C0	loop 48
C1	loop 49
C2	loop 50
C3	loop 51
C4	loop 52
C5	loop 53
C6	loop 54
C7	loop 55
C8	loop 56
C9	loop 57
CA	loop 58
CB	loop 59
CC	loop 60
CD	loop 61
CE	loop 62
CF	loop 63

Maintenance display codes

Dx Replace network, conference or TDS loop for group 2, where x is the loop number in hex (0-F = 64-79).

Group 2	Loop Number
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D0	loop 64
D1	loop 65
D2	loop 66
D3	loop 67
D4	loop 68
D5	loop 69
D6	loop 70
D7	loop 71
D8	loop 72
D9	loop 73
DA	loop 74
DB	loop 75
DC	loop 76
DD	loop 77
DE	loop 78
DF	loop 79

Ex Replace extender.

Note: Ex codes are also used to define network, conference, or TDS loops. Check the INI message to determine whether the HEX code is associated with an extender or loop.

Where x is:

- E0 : Local Extender CPU 0 to Group 0
- E1 : Local Extender CPU 0 to Group 1
- E2 : Local Extender CPU 0 to Group 2
- E3 : Local Extender CPU 0 to Group 3
- E4 : Local Extender CPU 0 to Group 4
- E8 : Remote Extender Group 0 to CPU 0
- E9 : Remote Extender Group 1 to CPU 0
- EA : Remote Extender Group 2 to CPU 0
- EB : Remote Extender Group 3 to CPU 0
- EC : Remote Extender Group 4 to CPU 0

Maintenance display codes

Fx Replace extender, where x is:

F0 : Local Extender CPU 1 to Group 0
F1 : Local Extender CPU 1 to Group 1
F2 : Local Extender CPU 1 to Group 2
F3 : Local Extender CPU 1 to Group 3
F4 : Local Extender CPU 1 to Group 4
F8 : Remote Extender Group 0 to CPU 1
F9 : Remote Extender Group 1 to CPU 1
FA : Remote Extender Group 2 to CPU 1
FB : Remote Extender Group 3 to CPU 1
FC : Remote Extender Group 4 to CPU 1
FF : All extenders disabled

010 Sequence, status flag, conditional jump problems.

For system Options XN and 71, replace: CT, FN, IF, MISC, CIM. For all other system Options, replace: FN, IF.

011 Call, return, micro return address stack problems.

For system Options XN and 71, replace: CT, FN, IF, MISC, CIM. For all other system Options, replace: FN, IF.

012 JNI to jump over to next page in ROM failed. Replace: CT, FN, IF, MISC, CIM.

013 Micro-store parity.

For system Options XN and 71, replace: CT, FN, IF, MISC, CIM. For all other system Options, replace IF.

020 Slice register arithmetic, logic problem.

For system Options XN and 71, replace: FN, CT, IF, MISC, CIM. For all other system Options, replace: FN, IF.

021 16-bit barrel shifter problems.

For system Options XN and 71, replace: FN, CT, IF, MISC, CIM. For all other system Options, replace: FN, IF.

022 16-bit barrel shifter problems with micro-store data.

For system Options XN and 71, replace: FN, CT, IF, MISC, CIM. For all other system Options, replace: FN, IF.

023 Write to background while at interrupt level.

For system Options XN and 71, replace: FN, MISC, CT, IF, CIM. For all other system Options, replace: FN, IF.

Maintenance display codes

- 024 Interrupt level did not write its bases.
For system Options XN and 71, replace: FN, MISC, CT, IF, CIM. For all other system Options, replace: FN, IF.
- 025 Bad data written to some interrupt level bases.
For system Options XN and 71, replace: FN, MISC, CT, IF, CIM. For all other system Options, replace: FN, IF.
- 026 Bad base fetch via BN at some interrupt level.
For system Options XN and 71, replace: FN, MISC, CT, IF, CIM. For all other system Options, replace: FN, IF.
- 027 24-bit ALU shifter problem. Replace: FN, IF.
- 042 CPU write protect failed Replace: MISC, IF, FN, CIM.
- 080 Stuck bits in Y-registers.
For system Options XN and 71, replace: CT, FN, IF, MISC, CIM. For all other system Options, replace: FN, IF.
- 081 Bad PSW register.
For system options XN and 71, replace: IF, MISC, CT, FN, CIM. For all other system options, replace: IF.
- 082 Bad FSI register.
For system Options XN and 71, replace: IF, MISC, CT, FN, CIM. For all other system Options, replace: FN, IF.
- 083 RAM addressing failure.
For system Options XN and 71, replace: FN, IF, CT, MISC, CIM. For all other system Options, replace: FN, IF.
- 084 Bad stack access at interrupt level.
For system Options XN and 71, replace: FN, MISC, CT, IF, CIM. For all other system Options, replace: FN, IF.
- 085 Faulty FAR register.
For system Options XN and 71, replace: IF, CT, FN, MISC, CIM. For all other system Options, replace: FN, IF.
- 086 Faulty FSR register Replace: IF, CT, FN, MISC, CIM.
- 087 Read/Write failure on Miscellaneous registers.
For system Options XN and 71, replace: MISC, IF, FN, CT, CIM. For all other system Options, replace: FN, IF.

Maintenance display codes

- 088 Fault during read/write operation while doing CPU tests.
For system Options XN and 71, replace: IF, MISC, CT, FN, CIM. For all other system Options, replace: FN, IF.
- 089 PC auto-increment failure.
For system Options XN and 71, replace: IF, MISC, CT, FN, CIM. For all other system Options, replace: FN, IF.
- 08A PS fetch using BIR, not blocked.
For system Options XN and 71, replace: MISC, IF, FN, CT, CIM. For all other system Options, replace: FN, IF.
- 08B RTC did not tick or clear.
For system Options XN and 71, replace: CIM, MISC, IF, FN, CT. For all other system options, replace: FN, IF.
- 08C Bad response timeout in FSI.
For system Options XN and 71, replace: IF, CT, FN, MISC, CIM. For all other system Options, replace: FN, IF.
- 08D Bad data in program store fetch.
For system Options XN and 71, replace: IF, MISC, CT, FN, CIM. For all other system Options, replace: FN, IF.
- 0FF Bad CIM. Replace: CIM, IF, MISC, FN, CT.

Maintenance display codes

Ex Replace network, conference or TDS loop for group 2

Note: Ex codes are also used to replace extenders. Check the INI message to determine whether the HEX code is associated with an extender or loop.

Where x is the loop number in hex (0-F = 80-95):

<u>Group 2</u>	<u>Loop Number</u>
E0	80
E1	81
E2	82
E3	83
E4	84
E5	85
E6	86
E7	87
E8	88
E9	89
EA	90
EB	91
EC	92
ED	93
EE	94
EF	95

FFx Replace network, conference or TDS loop for group 3, where x is the loop number in hex (0-F = 96-111).

<u>Group 3</u>	<u>Loop Number</u>
FF0	96
FF1	97
FF2	98
FF3	99
FF4	100
FF5	101
FF6	102
FF7	103
FF8	104
FF9	105
FFA	106
FFB	107
FFC	108
FFD	109
FFE	110
FFF	111

Maintenance display codes

- 10x Replace network, conference or TDS loop for group 3, where x is the loop number in hex (0-F = 112-127).

<u>Group 3</u>	<u>Loop Number</u>
100	112
101	113
102	114
103	115
104	116
105	117
106	118
107	119
108	120
109	121
10A	122
10B	123
10C	124
10D	125
10E	126
10F	127

- 11x Replace network, conference or TDS loop for group 4, where x is the loop number in hex (0-F = 128-143).

<u>Group 4</u>	<u>Loop Number</u>
110	128
111	129
112	130
113	131
114	132
115	133
116	134
117	135
118	136
119	137
11A	138
11B	139
11C	140
11D	141
11E	142
11F	143

Maintenance display codes

- 12x Replace network, conference or TDS loop for group 4, where x is the loop number in hex (0-F = 144-159).

<u>Group 4</u>	<u>Loop Number</u>
120	144
121	145
122	146
123	147
124	148
125	149
126	150
127	151
128	152
129	153
12A	154
12B	155
12C	156
12D	157
12E	158
12F	159

CDR Maintenance Display codes (CDR systems)

The codes provided below appear on the QPC41 MISC card maintenance display of the CDR CPU. Codes with ** after them apply only to Multi-port CDR machines. Refer to *CDR Maintenance* (553-2631-510).

CDR maintenance display codes

- 00 Trap caused by system power reset. This code is provided for information only.
- 01 The CDR CPU failed the CPU test. If CDR is not running, suspect one or more of the following packs:
- Arithmetic Logic Unit (ALU) - QPC40
 - Miscellaneous (MISC) - QPC41
 - Sequencer (SEQ) - QPC42
 - Read-only-memories (ROMs)
- If CDR is running then an intermittent fault is present. Use LD 42 to clear the CDR maintenance display or press the MAN INT button on multi-port CDR machines. If the problem recurs, suspect the packs listed above.
- 02, 03 The ROM failed to checksum correctly. Suspect ROM packs. If CDR is not running, suspect the following packs:
- 02 = CDR ROM 1 QPC131 (single port), QPC234 (multi-port)
 - 03 = CDR ROM 2 QPC132 (single port), QPC235 (multi-port)
- If neither of these packs clear the fault, suspect a processor fault. Respond as if 01 were in the display. If CDR is running, an intermittent fault is present. Use LD 42 to clear the CDR maintenance display. If the problem reappears, suspect the packs listed above. If the problem reappears and persists, treat it as a code 01.
- 05 Trap caused by response time-out. A device suddenly failed to respond. This could happen if an SDI card was removed without first using CDM to disable the card. If this problem is intermittent, a card may not be securely enough plugged into the CDR machine or may be faulty. If the problem still occurs, respond as for code 01.
- 06 Trap caused by write protection violation.
- 07 Trap caused by watchdog time-out. These codes probably indicate a CPU problem. Suspect cards in the same order as for code 01.
- 08 Trap caused by memory parity error. If this recurs after clearing the maintenance display, respond as for code 10.
- 09 Trap for indeterminable causes. This code probably indicates a CPU problem. Suspect packs in the same order as for code 01.
- 10 The read/write memory failed the memory test. If CDR is not running, suspect the memory pack.

CDR maintenance display codes

If CDR is running then an intermittent fault exists. Use LD 42 to clear the CDR maintenance display. If the fault recurs, suspect the packs listed above followed by the packs listed for code 01.

20, 21

CDR timing problem:

20 = CDR timing did not respond.

21 = CDR timing had a stuck interrupt.

For both 20 or 21 case suspect CDR Timing pack.

If CDR is not running, see 553-2631-510. If CDR is running, then an intermittent fault exists. Use LD 42 to clear the CDR maintenance display. If the problem recurs, suspect the packs listed above followed by all the packs listed for code 01.

30

The requested sequence is already being performed. Wait for it to complete.

31

The requested function can not be performed because another request is still pending. Wait for the pending function to complete or press the UNLOAD button to terminate it.

32

The requested function (RESTORE or LOAD) cannot be performed because CDM has been loaded and has put the CDR machine in maintenance mode.

See the discussion of maintenance mode in LD 42. If it is required to terminate the maintenance mode, UNLOAD may be pressed to unload the tape. Note that this may disturb the tests being performed by CDM.

33

RESTORE cannot be performed because a LOAD or UNLOAD sequence is in progress; wait for the sequence to complete.

34

LOAD can not be performed because the drive is not disabled or another function is in progress. If another function is being performed, wait for it to complete, then try again. If the drive is not disabled, you must UNLOAD the tape before you can LOAD it.

CAUTION: LOAD will destroy any data already written on the tape.

35

LOAD can not be performed because the tape is not at load point. UNLOAD and remount the tape.

CAUTION: LOAD will destroy any data already on the tape.

40

Cabinet over-temperature has been detected. Take appropriate temperature lowering measures.

41

Fan failure has been detected in CDR cooling unit. Clean filters and/or replace fan assembly.

50

LOAD cannot be performed because the tape is write protected. CDR will unload the reel of tape. Install a write enable ring in the supply reel and remount the tape.

CDR maintenance display codes

- 51 LOAD cannot be performed because the tape unit is not ready. This may be because it is rewinding. Wait for rewind to complete and make unit ready. Retry request.
- 52 LOAD failed after 10 tries. CDR will unload the tape. Retry the request with a different tape. If the problem persists then:
Clean the tape head path.
The tape unit may require calibration or be faulty.
Suspect QPC130 (Tape Control), QPC39 (Timing) or cables.
- 53 UNLOAD failed after 10 tries. CDR gives up.
- 54 The RESTORE function failed after 4 tries. CDR will wait 8 h and then try again. This code indicates that the error recovery attempt has failed.
Attempt to RESTORE the tape. If restore is successful, use LD 42 to clear the maintenance display or press MAN INT on a multi-port CDR machine. If the RESTORE fails, try cleaning the tape heads and path. Try RESTORE again. If it fails, try Loading a new tape. If this is successful, send the old tape for processing.
If the LOAD fails, suspect one or more of the following items:
 tape drive - may require calibration or repair
 QPC130 Tape Interface
 QPC39 Timing
 cables
If the problem is intermittent suspect the items listed above.
Since CDR will try the RESTORE again after an 8 h wait, the CDR machine may be recording data if more than 8 h has elapsed since the code was originally put in the display. This would indicate that the fault is intermittent.
- 55 End-of-tape encountered while doing a RESTORE. CDR will UNLOAD the tape.
The tape cannot be RESTORED since the tape mark at the end of the data cannot be found. If the tape has data on it, it should be sent for processing and a new tape mounted and LOADED to collect new data. If the problem persists, a faulty tape unit is suspected. This problem can also be caused by trying to RESTORE a blank tape.
- 56 Write protect was encountered while doing a RESTORE. Ensure that the write enable ring is installed. If the problem persists, suspect a tape reel or tape drive.
- 57 End-of-tape encountered while writing. CDR will UNLOAD the tape. Mount a new tape and LOAD it. Send the tape that was removed for processing. Depending on the period of time since the end of tape occurred, data may or may not have been lost.
- 70 CDR tape control pack did not respond.

CDR maintenance display codes

71 CDR tape control has a stuck interrupt. In either case suspect CDR Tape Control. If the CDR is not running see 553-2631-510. If the CDR is running, an intermittent fault exists. Use LD 42 to clear the CDR maintenance display or press MAN INT on a multi-port CDR machine. If the problem recurs, suspect the packs listed above followed by all packs listed for code 01.

8x SDI problem, where:

80 = SDI response time-out.

81 = SDI has permanent interrupt.

82 = SDI line is not ready.

83 = SDI lost an output interrupt.

For 80 to 83 suspect the SDI pack. Ensure that the speed select, address select and programming plugs are properly set. If the CDR is not running, see 553-2631-510. If CDR is running, an intermittent fault exists. Use LD 42 to clear the CDR maintenance display or press MAN INT on a multi-port CDR machine. If the problem recurs, suspect the packs listed above followed by all packs listed for code 01.

Code 82 can also be caused by a faulty modem or cable.

Regarding Codes Ax through Dx:

The following display codes (Ax through Dx) identify a problem in port x (0 to 15), where x is indicated as a hexadecimal device number in the range 0 to F. See hexadecimal conversion table in the first part of this practice.

Ax TTY x does not exist. This code will be displayed if the parameter on an ENL SL1 command refers to an SDI port which does not exist. Either the parameter was mis-specified or the address switches on the SDI card were set incorrectly. This error can also occur with a faulty SDI card.

Bx TTY x is not getting output interrupts. The SDI pack should be replaced. If this does not cure the problem, act as for code 01.

Cx "EIA Device Not Ready" status on TTY x. Unless the SDI card is faulty, this error indicates:

1. There is no connector attached to the faceplate of the SDI, or
2. A plug on the SDI pack is in the wrong position, or
3. A plug on the SDI pack is missing.

Dx Stuck interrupt on TTY x. Replace the SDI card. If this proves to be of no avail, treat the problem the same as for code 01.

I/O Processor (IOP) card displays

System Options 51C, 61C, 81, and 81C machines, the NT6D63 I/O Processor (IOP) card provides hexadecimal displays to indicate various phases of operation and the states the card is in during those phases.

Assembly level initialization and basic card self-tests are noted on the HEX display by decimal points appearing to the left of the HEX code.

High level code initialization and card self-tests have the decimal point to the right of the code to indicate they are taking place.

Card operation is indicated by the alternating decimal points.

Table 6: Assembly level initialization and basic card self-tests

Event	Hex code	LED state	Note
Power up	.0.	ON	Bootstrap code
Self-test 1	.1	ON	ROM checksum self-test
Self-test 1 fails	.1/.E.	ON	ROM checksum self-test failed (alternates 3 times)
Self-test 2	.2	ON	SRAM self-test
Self-test 2 fails	.2/.E.	ON	SRAM self-test failed (alternates 3 times)
Debug initialization	.3.	ON	IOP debugger initialization
Debug initialization failed	.3/.E.	ON	IOP debugger initialization failed (alternates 3 times)
Self-test 3	.3	ON	Processor self-test
Self-test 3 fails	.3/.E.	ON	Processor self-test failed (alternates 3 times)
Self-test 4	.4	ON	BIC Initial Condition Check
Self-test 4 fails	.4/.E.	ON	BIC Initial Condition Check failed (alternates 3 times)
Set up	.8	ON	Assembly level copying ROM to RAM, and miscellaneous initialization

Table 7: High level initialization and card self-tests

Event	Hex code	LED state	Note
Debug	.D.	ON	3 second window to enter the debugger by typing ^B, or in debugger
Set up	8.	OFF	Initialization and set up in C
Self-test a	1.	OFF	IOP registers self-test
Self-test a fails	1./ E	ON	IOP registers self-test failed (alternates 3 times)
Self-test b	2.	OFF	BIC self-test
Self-test b fails	2./ E	ON	BIC self-test failed (alternates 3 times)
Self-test c	3.	OFF	SCSI self-test
Self-test c failed	3./ E	ON	SCSI self-test failed (alternates 3 times)
Self-test e	5.	OFF	Security cartridge self-test
Self-test 3 fails	5./ E	ON	Security cartridge self-test failed (alternates 3 times)
Self-test f	6.	OFF	Duart self-test
Self-test f fails	6./ E	ON	Duart self-test failed (alternates 3 times)

Table 8: Operational states

Event	Hex code	LED state	Note
Ping	.9 / 9.	ON	IOP hunt cp/IOP test in progress
Disabled	.A / A.	ON	Operational and disabled, or waiting to hunt
Enabled	.A / A.	OFF	Operational and enabled
Maintenance message	.B / B.	OFF	Maintenance message sent (persists for about 1 second)
SCSI interrupt message	.F / F.	OFF	SCSI interrupt message sent (persists for about 1 second)
Debugger enabled	.D / D.	OFF	Operational, enabled and duart polled for ^B to enter
Debugger disabled	.D / D.	ON	Operational, disabled and duart polled for ^B to enter.
Debugger active	D	ON	In debugger
Error enabled	.E / E.	OFF	Soft reset occurred, enabled
Error disabled	.E / E.	ON	Soft reset occurred, disabled
Reset	.E.	ON	Hard reset initiated

Call Processor (CP) card displays

The NT6D66 Call Processor (CP) card in the Options 51C, 61C, 81, and 81C utilizes plain text messages as well as Hex for system maintenance, status, and errors. Table 9 lists the different LCD messages that appear on the CP card faceplate. The standard Hex messages also appear on this LCD display.

Table 9: NT6D66 CP card displays

Display output	Meaning
pack is AP: IDLE	Checking to determine if the system can be Split.
Type CTRL-B to run CP-BUG debugger	Option 81 start-up. Output to CP port prior to loading the operating system.
In CP-BUG	The debug program was entered.
Exit CP-BUG	The debug program is being exited.
BOOT ERROR: RPT. Init	System failed to initialize correctly
SIOx No Drv	No device driver associated with CP serial port x.
SIOx Created	CP serial port x already exists
SIOx Init Fail	CP serial port x failed to initialize the device specific database.